

Appl. No. 10/086,617
Amdt. Dated Nov. 10, 2003
Reply to Office Action of Aug. 13, 2003

Amendments to the Specification:

Please amend the specification as follows:

[0005] Moving fiber switches ~~involve~~ involves the actual physical movement of one or more of the fibers to specific positions to accomplish the transmission of a light beam from one fiber end to another under selected switching conditions. Moving optical component switches, on the other hand, ~~include~~ includes optical collimating lenses which expand the light beam coming from the fibers, and then, by using moving prisms or mirrors, ~~redirect~~ redirecting the expanded light beam to other fibers, as required by the switching process.

[0020] Fig. 5 is a perspective view of a second embodiment of an optical switch according to the present invention;

[0026] Turning first to FIG. 1, an optical switch 99 according to the present invention comprises a base 60, a switching element 40, a first input port 10, a first output port 15, a second input port 20, a second output port 25, a third input port 30, and a third output port 35. The base 60 has a space 67 in a center (not labeled) ~~of thereof, the base~~ and six symmetrical holders 61, 62, 63, 64, 65, 66 surrounding a circumference of the space 67 and extending ~~upward~~ upwardly from the base 60. The holders 61, 62, 63, 64, 65, 66 are angularly equally spaced, and each holds an input port or an output port. Specifically, they are spaced 60 degrees apart. The space 67 accommodates the switching element 40.

[0027] The switching element 40 comprises a supporter 45, a three-surface mirror 41 mounted on a center of the supporter 45, and a first reflector 42, a second reflector 43 and a third reflector 44 mounted on a circumference of the supporter 45. Referring to FIGS. 2-3, the three-surface mirror 41 is an equilateral triangle column, which defines a first reflecting surface 412, a second reflecting surface 413 and a third

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reflecting surface 414. The three reflecting surfaces 412, 413, 414 are positioned opposite to three reflecting surfaces of the three reflectors 42, 43, 44, respectively, to cause light beams to reflect between the two opposing reflecting surfaces of the three-surface mirror 41 and the three reflectors 42, 43, 44.

[0029] Each of the second input and output ports 20, 25 and the third input and output ports 30, 35 has a collimator 22, 24, 32, 34 which accepts insertion of a fiber 21, 23, 31, 33 in the exact same way as the first input and output ports 10, 15. The second input collimator 22 is opposite to and aligned with the second output collimator 24 to direct light beams from the second input fiber 22 to the second output fiber 23. The third input collimator 32 is opposite to and aligned with the-a third output collimator 34 to direct light beams from a third input fiber 31 to a third output fiber 33.

[0030] In assembly, the six collimators 12, 14, 22, 24, 32, 34 are assembled in respective holders 63, 66, 61, 64, 65, 62 and accept insertion of respective ~~fiber-fibers~~ 11, 13, 21, 23, 31, 33. The six symmetrical holders 61, 62, 63, 64, 65, 66 of the base 60 hold the first input collimator 12, the first output collimator 14, the second input collimator 22, the second output collimator 24, the third input collimator 32 and the third output collimator 34 in alignment to allow light beams from each input fiber 11, 21, 31 to be output by the corresponding output fiber 13, 23, 33 when no element ~~block-blocks~~ the space 67. The switching element 40 can be accommodated in the space 67 surrounded by the input and output ports 10, 15, 20, 25, 30, 35. A driver (not shown) connects with the switching element 40 and drives the switching element to move in or out of the space 67, or to rotate in the space 67.

[0031] In response to electrical signals, the driver drives the switching element 40 to move between a first position, where the switching element

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40 is positioned out of the space 67, a second position, where the switching element 40 is positioned in the space 67, and a third position, where the switching element 40 is positioned in the space 67 but is rotated anticlockwise ~~rotates~~ 60 degrees relative to the second position.

[0035] FIGS. 5-8 show drawings describing operation of a second embodiment of an optical switch in accordance with the present invention, which is designed by the reference 99' for distinction. The optical switch 99' makes use of four reflectors to switch three input light beams among alternate optical paths. The ~~fourth-four~~ reflectors are a first reflector 42', a second reflector 43', a fourth reflector 47 and a fifth reflector 48. The four reflectors 42', 43', 47, 48 are mounted parallel to one another on the supporter 45'. The switching element 40' connects with a driver (not shown), which drives the switching element 40' to rotate among three positions.

[0036] Turning first to FIG. 6, the switching element 40' is in a first position. The fourth reflector 47 is in the optical path of the second input collimator 22' and the third output collimator 34', and the fifth reflector 48 is in the optical path of the third input collimator 32' and the second output collimator 24'. Light beams from the first input fiber 11' are directed to the first output fiber 13' sequentially through the first input collimator 12' and the first output collimator 14'. Light beams from the second input fiber 21' are directed to the fourth reflector 47 through the second input collimator 22', and are then reflected between the fourth reflector 47 and the second reflector 43' to the third output fiber 33' through the third output collimator 34'. In like manner, light beams from the third input fiber 31' pass through the third input collimator 32', are reflected between the fifth reflector 48 and the first reflector 42', and pass through the second output collimator 24' to be output by the second output fiber 23'.

[0040-] It is to be understood, however, that even though numerous

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characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed. For example, the optical switch may use the switching element 40 and the switching element 40' in the same switch to realize different optical path switching possibilities.